

## Remarks/Arguments

Claims 1-30 are pending in the application. Claims 1-30 are rejected. Claims 1-30 are cancelled, and new claims 31-55 are added. No new matter has been added. Support for claim 31-55 is indicated in the annotated version of the claims attached hereto as Appendix A. All reference to paragraph numbers are taken from this application's published document, US-2006-0124084-A1.

### Rejections under 35 USC §§ 102 and 103

Applicant respectfully submits that the rejections under Hofbauer, Greene, and Karl are traversed in view of the new claims.<sup>1</sup>

The primary reference used in rejecting the claims as anticipated or obvious is USP 6,170,443 to Hofbauer et al. One of the inventors listed on that reference is that same as one of the inventors on the present application. Applicant therefore understands the disclosure of the Hofbauer and can readily distinguish over it. Hofbauer has several fundamental differences from the present application, as follows.

The intake and exhaust ports in one cylinder are reversed relative to the other cylinder: in one cylinder the intake port is on the inside, and the exhaust port is on the outside; in the other cylinder, the intake port is on the outside, and the exhaust is on the inside.

In contrast, claims 41-46 are directed to an arrangement where both cylinders have intake ports on the inside, and exhaust ports on the outside. In other words, there is a mirrored arrangement of ports. One advantage of mirroring is that the inner pistons from opposite cylinders can share a common journal, as can the outer pistons. Relative to Hofbauer, this arrangement eliminates three entire journals in a four piston, opposed piston, opposed cylinder

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<sup>1</sup> Applicant's submission of new claims is not an acquiescence in any grounds for rejection, and Applicant reserves the right to pursue the rejected subject matter of claims 1-30 via a continuation application.

engine, allowing for a more compact, lighter-weight and well balanced engine. This is illustrated by comparing Fig. 7 of Hofbauer with Fig. 17 of the present application.

Because the Hofbauer cylinders are not mirrored, neither the inner piston pair nor the outer piston pair can share a common journal on a crankshaft disposed between the cylinders. In Hofbauer, the necessary asymmetric timing is created by the phase angle of the split pin. Split pins are critical regarding the stresses in the crankshaft and should be avoided.

Another significant difference between Hofbauer and certain embodiments of the claimed inventions is that the cylinders and pistons can be aligned on a common axis using connecting rods that may also align on a common axis. (See claims 32-33, 35-53, and 55.) This is not the case in Hofbauer. (See, e.g., Hofbauer, Figs. 6-7.) For at least one or both reasons, the present claims reciting mirrored cylinders or common journals, for example, are patentably distinct over Hofbauer.

Claims 31-39, 45, 54 and 55 recite a scavenging pump with certain features. The Action asserts that that Greene discloses a scavenging pump having a first scavenging chamber 27 and second scavenging chamber 30. In Greene, the asserted chambers are on opposite sides of the crankshaft. Therefore, the asserted chambers are not the claimed arrangement of first and second chambers, 105 (205), 109 (209) defined by a movable plunger 118 (218) that moves in unison with an outer piston 110 (210). Claim 31, which is representative of the claims, recites a scavenging pump, with double action:

"wherein the pump is configured to draw fluid into the first chamber from outside the pump when the outer piston is moving toward from the inner piston, and to direct the fluid from the first chamber into the second chamber, pressurizing it, when the outer piston is moving away from the inner piston " (Claim 31)

In contrast, Greene discloses an inefficient, single-action pump that differs from the claimed scavenging pump in several ways. This is apparent from, e.g., Fig. 8 in Greene. As outer piston 21 moves rearward toward the opening of passage 62, it closes port 64 to

compress air in the chamber directing it into the passage for port 62, which appears to lead to the combustion chamber. The fluid is not directed to a second chamber that communicates with the intake ports, as claimed.

Further, the outer piston's movement toward the inner piston 25, it is not pulling air into chamber because the outer piston reaches a stop as soon as port 64 is open.

Another significant difference is that Greene discloses a system where a given pump pressurizes the adjacent piston cylinder only, and not the opposite one across the crankshaft. This means that Greene cannot apply continuous pressure to intake ports. In contrast, the claimed invention, in certain embodiments, uses opposing scavenging pumps, with double action, so that there is always one pump applying pressure to the open intake ports. Claims 31-35, 39, 40, 45, 54, and 55 distinguish over Hofbauer in view of Greene at least for the reason that they recite that one pump communicates to the opposite cylinder.

In certain embodiments, the claimed pump provides for continuous pressurization of intake ports, which results in a significant performance advantage over the system of Greene.

The Karl reference is asserted to show connecting rods with two tangs and a single tang on the same journal. Karl's specification does not provide any detail on how the tangs are arranged on the journal. Karl's figures are also generalized and do not show any level of detail as to how the connecting rods and/or journal are assembled. *See Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956, 55 USPQ2d 1487, 1491 (Fed. Cir. 2000) ("[I]t is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.") Applicant admits that while there may have been instances of the arrangement two-tang/one-tang on a common journal in the prior art, Applicant's belief is that such prior art used three bearings side by side between the crankshaft journal, two for the two tangs and one for the single tang. There is no teaching or disclosure for the use of a single bearing over which all

tangs are disposed, or for the use of a built-up crankshaft, as claimed in certain embodiments. (See claims 38, 43, and 52.) The use of a single bearing goes against conventional thinking and provides a surface that better handles friction and stresses.

Nothing herein should be deemed as a disclaimer or surrender of any rights, acquiescence in any rejection, or a waiver of any arguments that might have been raised but were not raised herein or otherwise in the prosecution of this application. Applicant reserves all rights and subject matter with respect to claims being or to be pursued in this or a related application.

### **CONCLUSION**

Applicant submits that in view of the foregoing remarks and/or amendments, the application is in condition for allowance, and favorable action is respectfully requested.

The Commissioner is hereby authorized to charge any fees, including extension fees, or to charge any additional fees or underpayments, or to credit any overpayments, to the Credit Card account referenced via the EFS Web Electronic Filing System. As an alternative, in case the Credit Card cannot be processed, the Commissioner is hereby authorized to charge any fees, additional fees, or underpayments, or to credit any overpayments, to Deposit Account No. 50-1001.

Respectfully submitted,

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